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leaving the harbour, on the 5th of November, they again returned, and continued, with their usual regularity, until the arrival of the ship at the entrance of Hoogly river, on the 3rd of December. While the ship continued in the lower part of that river, a slight tendency to the equatropical motions might be perceived; but up the river, at Diamond harbour, the mercury was nearly stationary the whole twenty-four hours.

On the 13th of January 1804, after clearing Hoogly river, the equatropical motions again returned, and continued until the arrival of the ship at Bombay, on the 12th of February; from which day to the 18th, when the journal ceases, no signs of the above motions could be perceived.

*Concerning the Differences in the magnetic Needle, on Board the Investigator, arising from an Alteration in the Direction of the Ship's Head.* By Matthew Flinders, Esq. Commander of His Majesty's Ship Investigator. In a Letter to the Right Hon. Sir Joseph Banks, K.B. P.R.S. Read March 28, 1805. [*Phil. Trans.* 1805, p. 186.]

In the years 1801 and 1802, while Capt. Flinders, on board the Investigator, was surveying the south coast of New Holland, he observed a difference in the direction of the magnetic needle, for which there appeared no other cause than that of the ship's head being in a different direction. The compasses made use of on board the above-mentioned ship were of Walker's construction, one excepted, which was made by Adams; and it appears, from a table of observations given by Capt. Flinders, that some of the variations here treated of were  $4^{\circ}$  less, and others  $4^{\circ}$  greater than the truth. It also appears, that when this error was to the west, the ship's head was to the east, or nearly so; when the error was eastward, the ship's head was in a contrary direction; and when the observations agree best with those taken on shore, which may be considered as having the true variation, the ship's head was nearly north or south. A minute inspection of the table seems to favour the opinion, that the excess or diminution of the variation was generally in proportion to the inclination of the ship's head, from the magnetic meridian, on either side.

Capt. Flinders, having ascertained the certainty of a difference in the compass, arising from an alteration in the point steered, thought it necessary, when he wanted a set of bearings from a point where the ship tacked, to take one set just before and another immediately after that operation. Several specimens of the manner in which these bearings were taken are given; also a specimen of the plan he followed in protracting such bearings: these specimens are in the form of tables, and are not of a nature to be abridged.

With respect to the cause of the differences here treated of, Capt. Flinders offers the following conjectures:—

1st, That the attractive power of the different substances in a ship, which are capable of affecting the compass, is brought into a sort of focal point nearly in the centre of the ship, where the shot are de-

posited; the greatest quantity of iron being collected together at that part.

2ndly, That this point is endued with the same kind of attraction as the pole of the hemisphere where the ship is: consequently, in New Holland, the south end of the needle would be attracted by it, and the north end repelled.

3rdly, That the attractive power of this point, in a ship of war, is sufficiently strong to interfere with the action of the magnetic poles, upon a compass placed upon or in the binacle.

The above suppositions, Capt. Flinders thinks, will account for all the observed differences: and, admitting this opinion to be well founded, it ought, he says, to follow, that when the ship is on the north side of the magnetic equator, the differences in the variation of the magnetic needle, arising from a change in the ship's head, must be directly contrary to those above described. A few observations are given, which tend to confirm this opinion, and which also seem to show that the variation is more westerly when taken upon the binacle of a ship whose head is westward in north latitude, than when observed in the centre of the ship.

Capt. Cook having observed a considerable variation in the compass while taking some observations upon Pier Head, on the coast of New Holland, Capt. Flinders thought it right to make some fresh observations at that place. He found, as Capt. Cook had done, that the stones which lay on the surface of the ground did not produce any sensible effect upon the needle, but that a considerable variation took place, by a change of situation of a few yards only, at the top of the hill. Whether this arises from a particular magnetic substance lodged in the heart of the hill, or from the attractive powers of all the substances of which Pier Head is composed being centered in a point, similar to what Capt. Flinders has supposed to happen in a ship, is, he says, a question he shall not attempt to decide.

*The Physiology of the Stapes, one of the Bones of the Organ of Hearing; deduced from a comparative View of its Structure and Uses in different Animals. By Anthony Carlisle, Esq. F.R.S. Read April 4, 1805. [Phil. Trans. 1805, p. 198.]*

The bones of the organ of hearing, or ossicula auditûs, in man and in the mammalia, form, Mr. Carlisle says, a series of conductors, whose office seems limited to the conveyance of sounds received through the medium of air; no parts corresponding to such bones being found in fishes. In two of the classes of animals, however, namely, birds, and the amphibia of Linnæus, there is only one ossicle of the tympanum, which is in the situation of the stapes.

Mr. Carlisle then proceeds to give a minute description of the human ossicula auditûs, especially of the stapes. This description we shall pass over, that we may be the more particular in our account of the varieties observed in the last-mentioned bone in other animals.

The configuration of the stapes, or indeed of the other ossicles, is